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Document 2

RURAL LANDSCAPE AND BORDERLAND FARMING ON THE UPPER RHINE FRONTIER IN ROMAN TIMES : EVALUATING THE CASE OF OEDENBURG (HAUT-RHIN, FRANCE)

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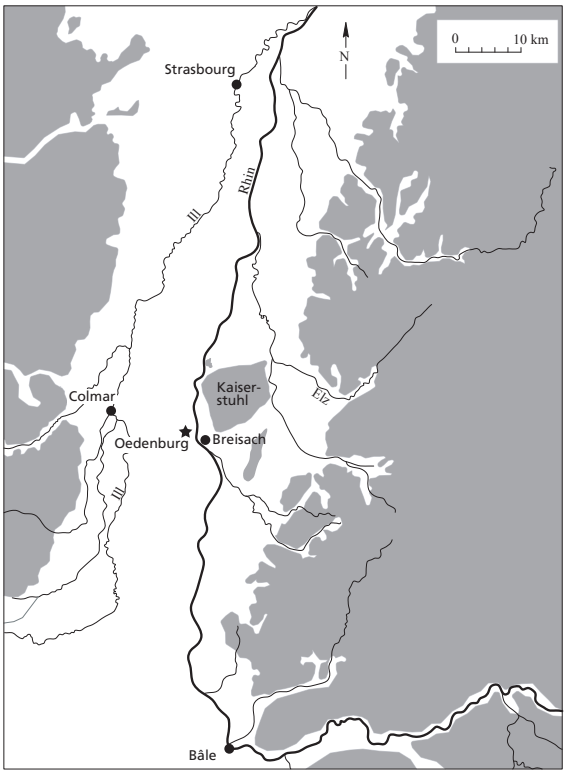
Introduction : feeding the Roman army and the site of Oedenburg

For some time now attention has been drawn to the limited capacity of the Dutch river area to supply the Roman army settled along the Rhine, especially during the phase of conquest when the population surged within a few years (Kooistra 1996; Cavallo & Kooistra 2008). In this 'non-villa landscape' (Roymans & Derks 2011; Habermehl 2013) where the sandy soils were unable to produce surpluses and were traditionally given over to animal husbandry rather than wheat production, cereals for the army had to be imported from abroad and especially from northern Gaul (Reddé 2011b; Roymans 2014). Although some adjustments have recently been made to this claim (Kooistra & Van Dinter 2013; Van Dinter & Kooistra 2014), the rural landscape of the Rhine delta was not as productive in Roman times as, say, the loess countries further south or Picardy in modern France. But the question of a sustainable farming system to supply the Roman army should not be confined to the Dutch river area. In the upper Rhine valley, between Strasbourg (France) and Basel (Switzerland), where the geological and geomorphological conditions are quite different, the development of the Roman Frontier in the early first century AD raises the same question: Was the country ready to feed the army and how? Recent excavations at the Gallo-Roman site of Oedenburg (Biesheim-Kunheim, Haut-Rhin, France) cast some new light on this subject.



+ Fig. 1. The site of Oedenburg in its regional setting (M. Reddé).

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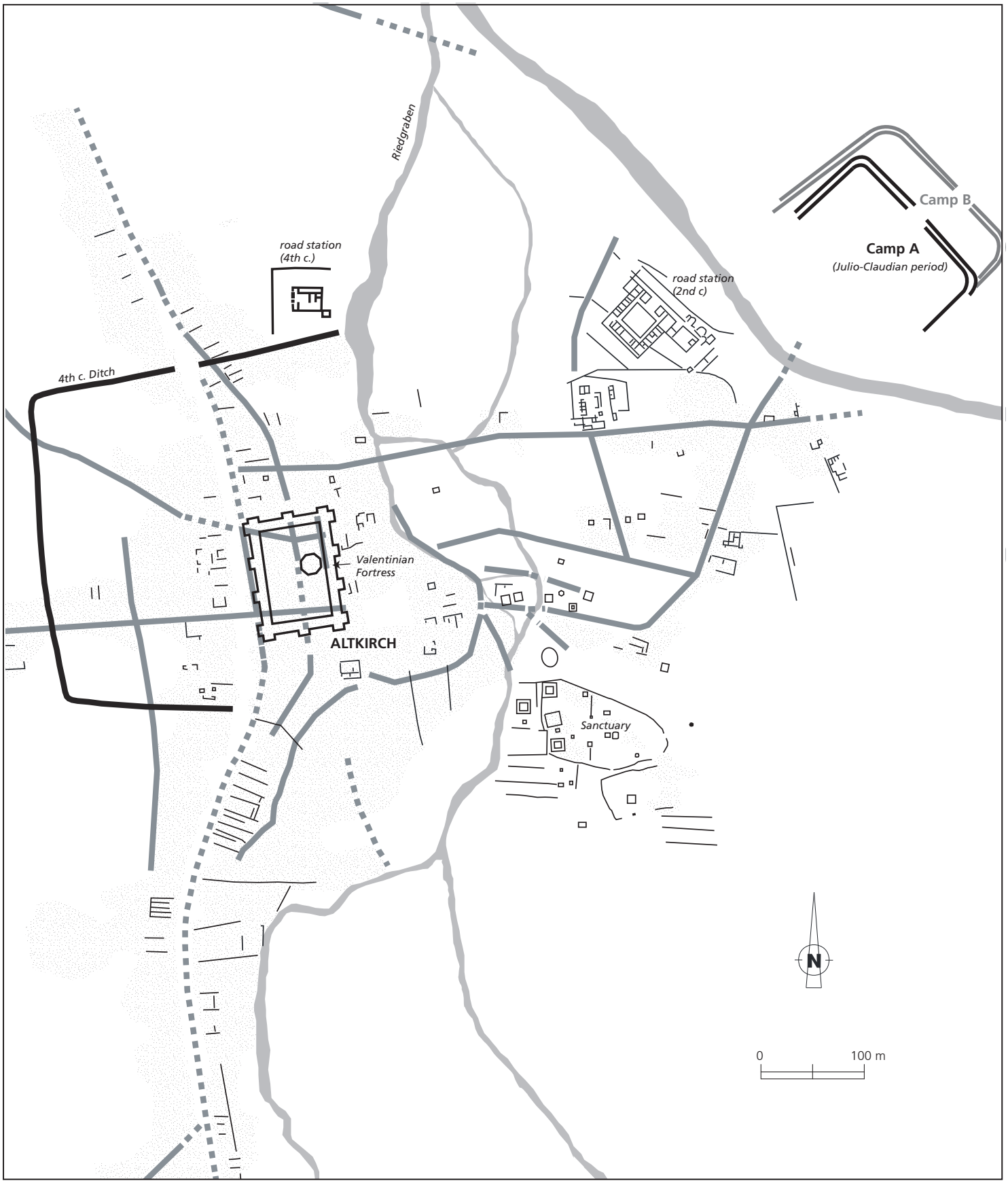


+ Fig. 2. Schematic topography of the Oedenburg site after information from geomagnetic prospecting (Posselt & Zickgraf Prospektionen), aerial photographs and excavations (M. Reddé).

The site of Oedenburg lies beside an abandoned branch of the River Rhine opposite the Kaiserstuhl hills and close to the Celtic oppidum of Breisach (fig. 1). Various excavation campaigns have been conducted there since 1998 under a Franco-German-Swiss programme, a part of which has now been published (Reddé 2009; Reddé 2011a)[1]. The excavations revealed a Gallo-Roman sanctuary with religious depositions directly on the ground inside a large fenced enclosure, from the earliest years of our era. To date, no habitat earlier than the end of La Tène or even the early Augustan period has been found on the site itself. It is questionable therefore whether this seemingly 'isolated' sanctuary was the origin of the subsequent Roman agglomeration or whether the traces of possible human occupation remain hidden somewhere in this sector of the Rhine floodplain. Occupation of the nearby hillfort of Breisach, beside the river, on the present-day German bank, or that may even have been sited on an island in ancient times, ceased around the year 30 BCE (Wendling 2012).

At around 15–20 CE, a first military settlement (camp B) was set up on an island protected from annual flooding (fig. 2). A second settlement (camp A) followed under Claudius. The garrison, which was in all likelihood connected with that of the legions of Windisch (Switzerland), remained until the onset of the Flavian period (70-96 AD). That period was marked in this region by the conquest of the *Agri Decumates* and the shifting of the frontier beyond the Rhine at the beginning of Vespasian's reign. From the years 20/30 of our era (i.e. with a good decade or two's delay), a civilian population progressively settled. The town that formed developed autonomously after the departure of the army, continuing uninterrupted until the beginning of the fifth century of our era, even after the *limes* was abandoned in 260. However, at no time did it have the monumental trappings and classical urban organisation of a chief town.

Three questions are addressed here:

1- How did the site evolve geomorphologically during the long period of settlement?

2- What was the human settlement of this small region, now known as the 'Pays de Brisach' like?

3- Can an agro/sylvo/pastoral geography of this sector be outlined?

The site's geomorphological evolution

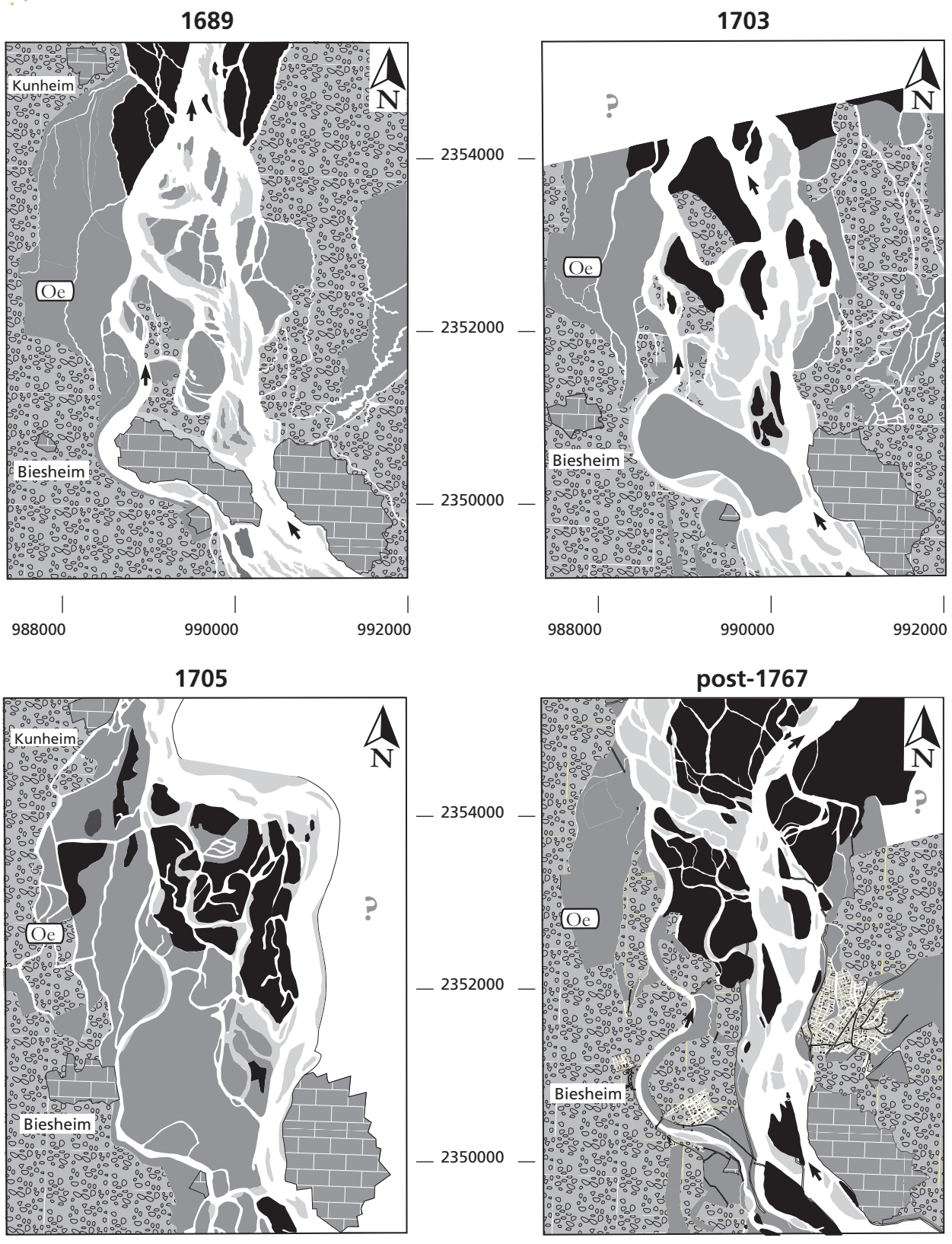
A changing alluvial pattern

Examination of ancient maps, of recent aerial photographs and of the various geological and archaeological cross-sections from the excavations of Oedenburg have shown that the ancient agglomeration was sited in a continually shifting wet zone. It is puzzling why the Ancients settled in what was on the face of it such an unwelcoming environment.

The quite numerous topographical surveys made in the seventeenth and eighteenth centuries of the border area disputed between France and the Holy Roman Empire show the continual shifts in the course of the Rhine. Its braided course formed many islets that were forever being reshaped but that made the river easier to cross (fig. 3). This crossing point seems to have justified the ancient military occupation of Oedenburg and is reflected by the presence of several facilities for accommodating travellers, or public officials at any rate. At least one second-century *mansio* and a roadside *praetorium* from the time of Constantine are known. Various ancient routes converge at this crossing point and this was probably one of the decisive factors for its settlement despite it being so prone to flooding.

A map by A. Cestre from 1877 attests to the persistence of this geography until the modern canalisation of the Rhine and incidentally of the limits of the exceptional flood of 1876 (fig. 4). Modern aerial photographs reveal the traces of this complex alluvial pattern.

1 Data are from the two monographs cited here (Reddé 2009 and Reddé 2011a) and from their various authors: Ch. Petit (University of Paris 1), V. Ollive (University of Nancy), J.-P. Garcia (University of Dijon) for geomorphology, H. Richard (CNRS) for palynology, St. Jacomet and P. Vandorpe (IPNA, University of Basel, Switzerland) for carpology. The interpretation and any mistakes are my own.



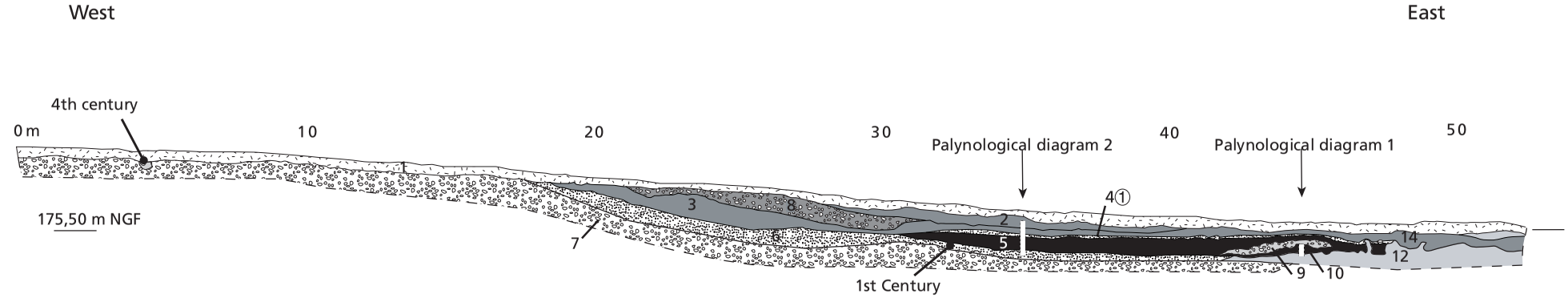
+ Fig. 3. Changes in the course of the Rhine in the sector of Breisach between 1689 and 1767 (interpretation V. Ollive).

+ Fig. 4. Map of the surroundings of Oedenburg by A. Cestre (1877).

Reconstructing the Roman Landscape

A major section in a small branch of the Rhine (the Riedgraben) on the western boundary of the flood zone provides insight into the geomorphological evolution of this sector and its ecology in ancient times (fig. 5).

The earliest and deepest water course, some 70 m wide, yields a palynological sequence suggesting it was emplaced during the Late Glacial in a cold climate and a locally wet, open steppe environment. A second incision is clearly identified in the cross-section but the channel that then formed was just 25 m wide. The channel fill is mostly of organic material but it does contain some archaeological remains dated to the first century of our era. Succeeding the emplacement of these active channel bottom sands, fine organo-mineral sediments developed in this water course as it changed to dry land. These sediments display an abundance of aquatic plants and of wet banks, which have been recorded and analysed. Taxa characteristic of eutrophised environments are found such as ruderal plants (*Polygonum var. bidens*, *Ranunculus sceleratus*) or horned pondweed (*Zannichellia*), an aquatic plant of polluted environments, reflecting the influence of nearby human activities in this environment. Also found are remains of walnuts, grapes, plums and celery as well as cereals contemporaneous with the Roman occupation of Oedenburg. Within the channel-fill material, the succession of several sedimentary facies accounts for its evolution. At the base, dark brown, marshy, peat type deposits rich in organic matter are characteristic of abandoned channels overgrown by dense vegetation. Between 1850 ± 30 years BP and 1745 ± 30 years BP, that is, from 80 to 390 cal. AD a stratigraphic unit formed exhibiting a 6-20% enrichment in organic matter whereas the mineral fraction remained low carbonate



a Sandy silts and clays
b1 Organic clayey silts
b2 Organic clayey silts « Peat deposit »
c Sands and gravels (base of a channel or flood deposits)
e1 Gravels and pebbles (anthropogenic structures)
f Agricultural soil
g Gravels and pebbles in a sandy matrix
c_o Colluvium

0 2m

Inondation enregistrée

Structure et mobilier archéologique

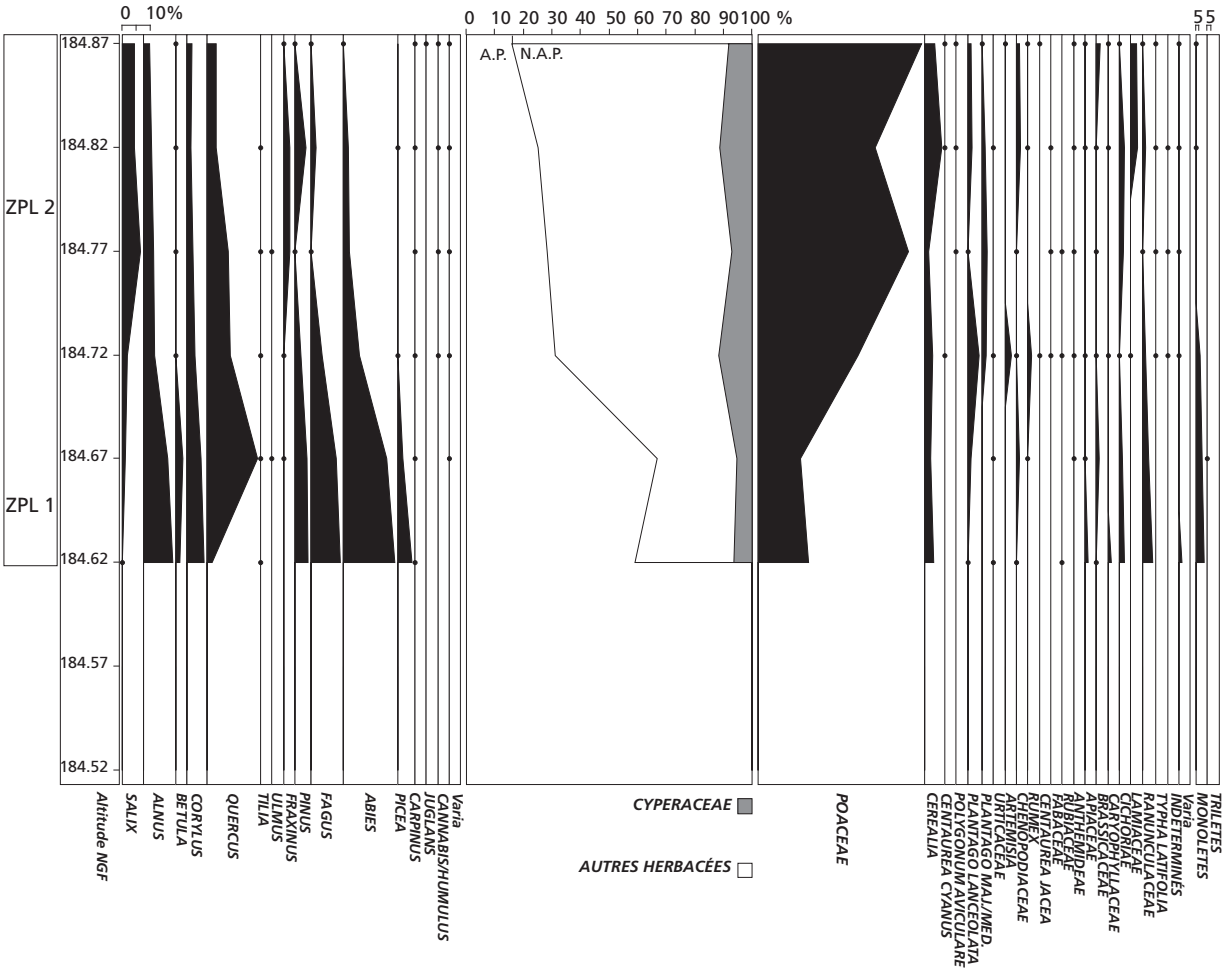
+ Fig. 5. Section through the Riedgraben, north of the fortress of Altkirch (V. Ollive / Ch. Petit / J.-P. Garcia).

silt-sand. This reflected the gradual development of marshland vegetation filling the channel. A flooding episode occurred after the radiocarbon date 1745 ± 30 years BP, that is, 220–390 cal. A.D., and so may be attributed to the third or fourth century of our era.

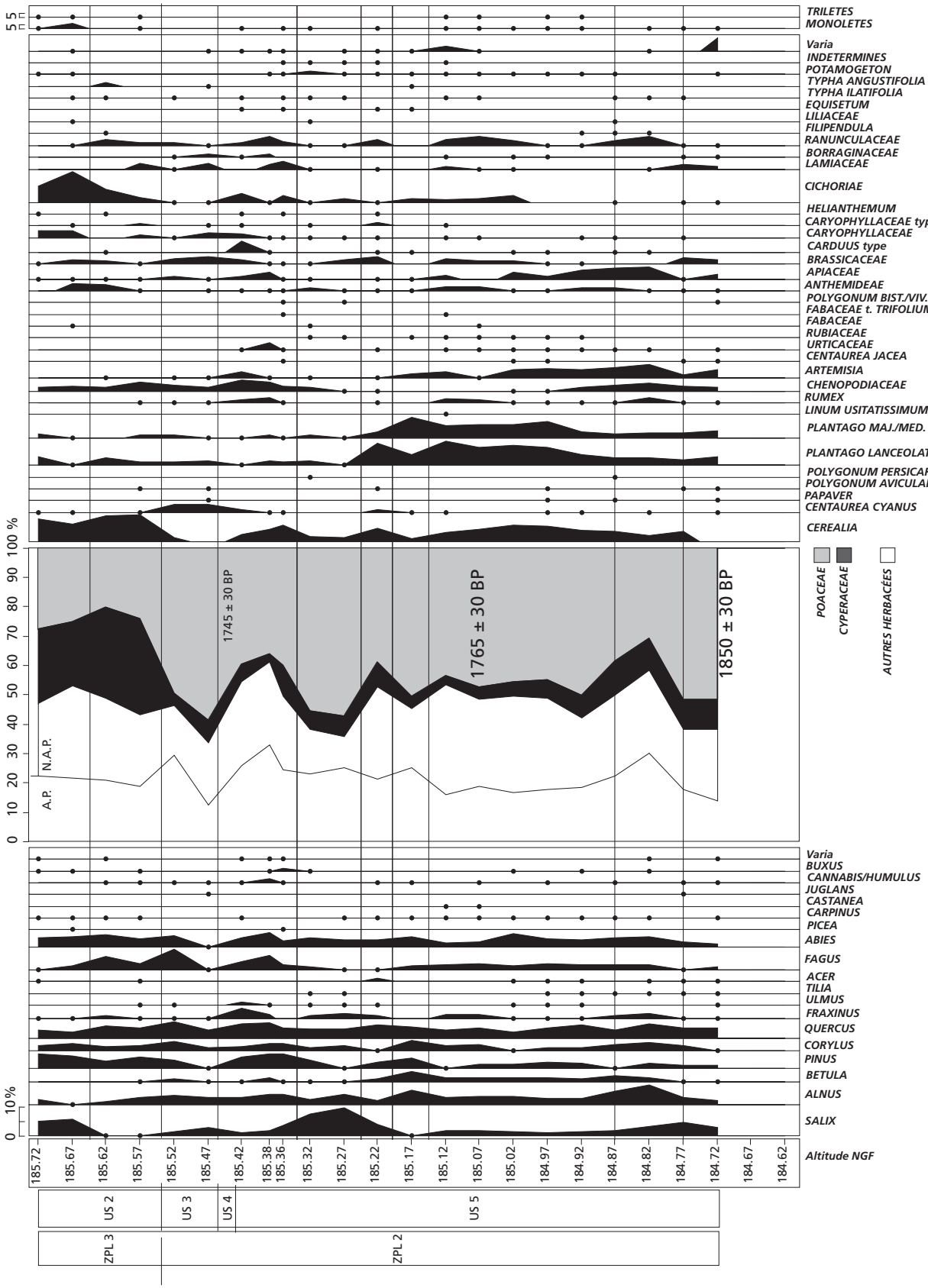
At the top of the section the fine, silt-clay and organic deposits, typically of the Ried, draping all of the alluvial plain reflect the development of marshland when the water table was almost permanently high. These marshy conditions seem to have set in from the end of Roman times and persisted until contemporary drainage dried the Rhine floodplain.

Palynological diagrams account for the change in plant cover from the first to fifth centuries of our era (fig. 6-7). At the base of the most recent channel (ZPL1), trees are plentiful (AP verging on 60%) and characterised by the association of alder, oak and beech (palynological diagram 1, see location on fig. 5). The herbaceous plants include mostly grasses (poaceae) (20%) and sedges (*cyperaceae*) (10%). Cereals and plants from trodden zones such as plantain are found. These palynological suites are indicative of vegetation little affected by human activity and dominated by hardwood forests.

The second sequence (ZPL2) is made up of marshland organic layers. Trees make up no more than 20% of the vegetation with a marked reduction in pollen from fir, spruce, beech, pine and birch (fig. 7; see the location of palynological diagram 2 in fig. 5). However, oak pollen persists at 5-10%. Soft wood species like willow and alder vary in frequency from 0 to 10%. This seems to attest to environmental changes in the alluvial forest. The herbaceous suite is substantial and varied (NAP verging on 80%). It is dominated by grasses (*poaceae*) (40-60%) while sedges (*cyperaceae*) are consistently below 10%. Cereals make up as much as 5% of the vegetation at times. Plantains (*Plantago major/media*, *Plantago lanceolata*) are common until mid-sequence. The other herbaceous plants such as buttercups (*Ranunculaceae*), cornflower and knapweed (*Centaurea cyanus* and *C. jacea*) are invariably present. These taxa associated with agro-pastoral activities reflect the nearby presence of cereal crops and wet grassland for pasture. The clearance of the woodland marking the onset of the second sequence could correspond to the early stages of



+ Fig. 6. Palynological diagram 1 (H. Richard).



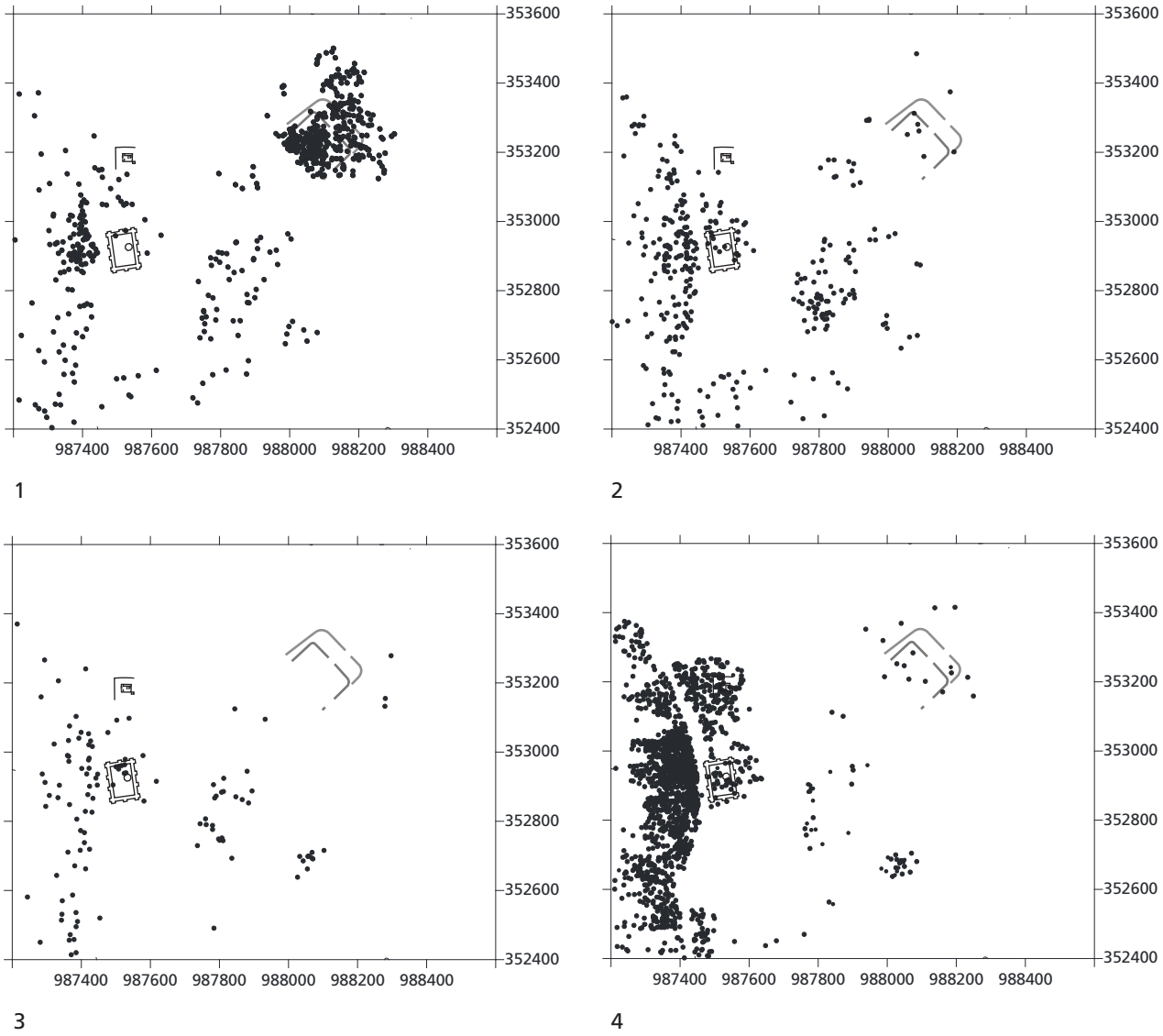
+ Fig. 7. Palynological diagram 2 (H. Richard).

development of the Oedenburg agglomeration in the course of the first century. In this largely open and marshland landscape diversely evolved forests of soft and hardwood developed. The frequent reduction in age of the forest structure perceptible in the palynological diagram from the increase in willow and grasses might be attributable to the flooding pattern of the Rhine.

The third sequence (ZPL 3) was contemporaneous with the emplacement of the black Ried (fig. 7). While the forest cover remained sparse, the structure of the herbaceous stratum changed radically. Grasses were replaced by sedges which made up more than 25% of the vegetation. Cereals, which then made up 10%, were found along with plants from meadowland and trampled environments (ribwort plantain, chicory, buttercups, etc.). This palynological suite reflects an environment exploited for agro-pastoral activities composed probably of wet meadowland lying below the cultivated alluvial terrace[2].

All of these palynological data reflect the natural and anthropic character of the vegetation of the Gallo-Roman Rhine plain. It formed a mosaic of alluvial forests, meadowland and agricultural plots in which the districts of the Oedenburg agglomeration were organised. It also exhibits a quite sharp change in the plant cover from the early stages of the Gallo-Roman period to the latest ones.

Spatial analysis of the distribution of coins found at the site also attests to the gradual infilling of the low parts of the site (fig. 8). The emplacement of a marshland zone during Roman times forced the human settlement into drier



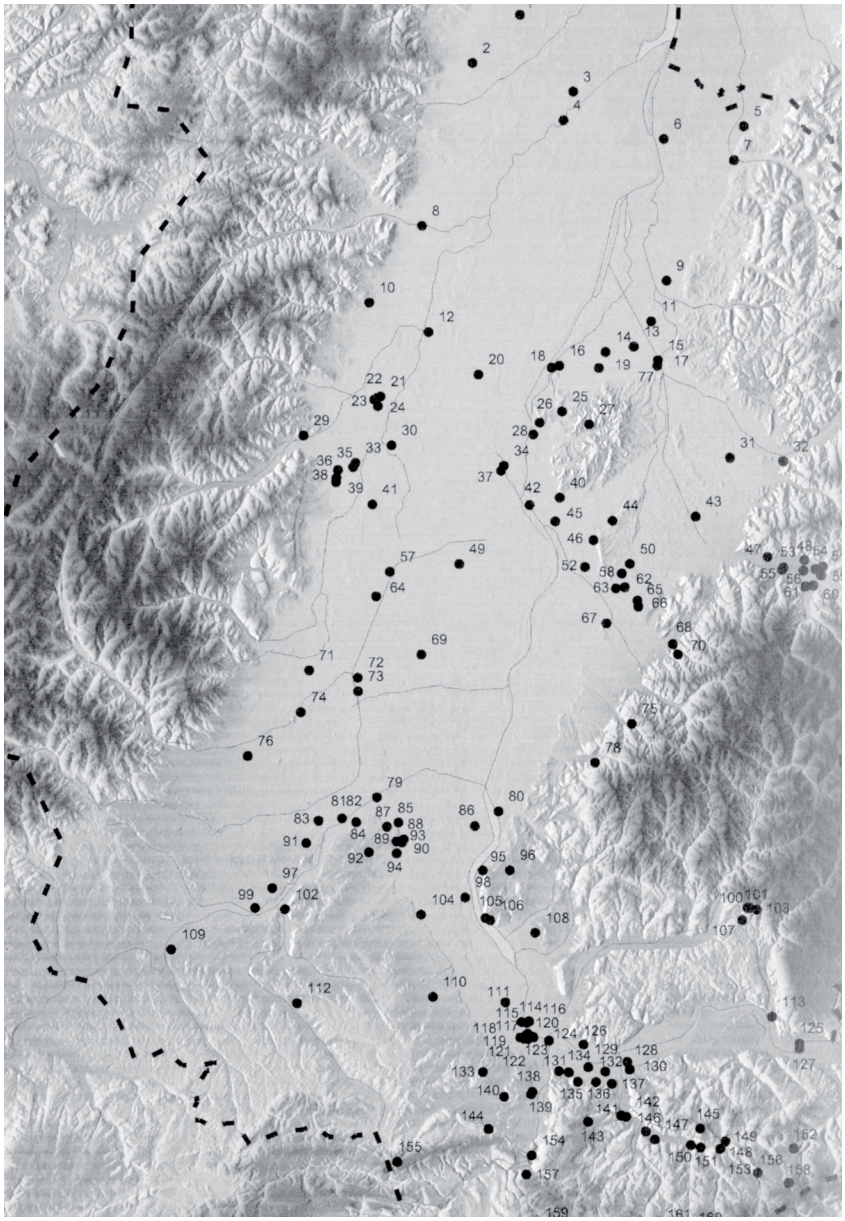
+ Fig. 8. Spatial evolution of the distribution of coinage discovered at Oedenburg (V. Ollive).

2 This is a simplified summary of the contribution by V. Ollive, Chr. Petit, J.-P. Garcia and H. Richard published in Oedenburg II, p. 13-21.

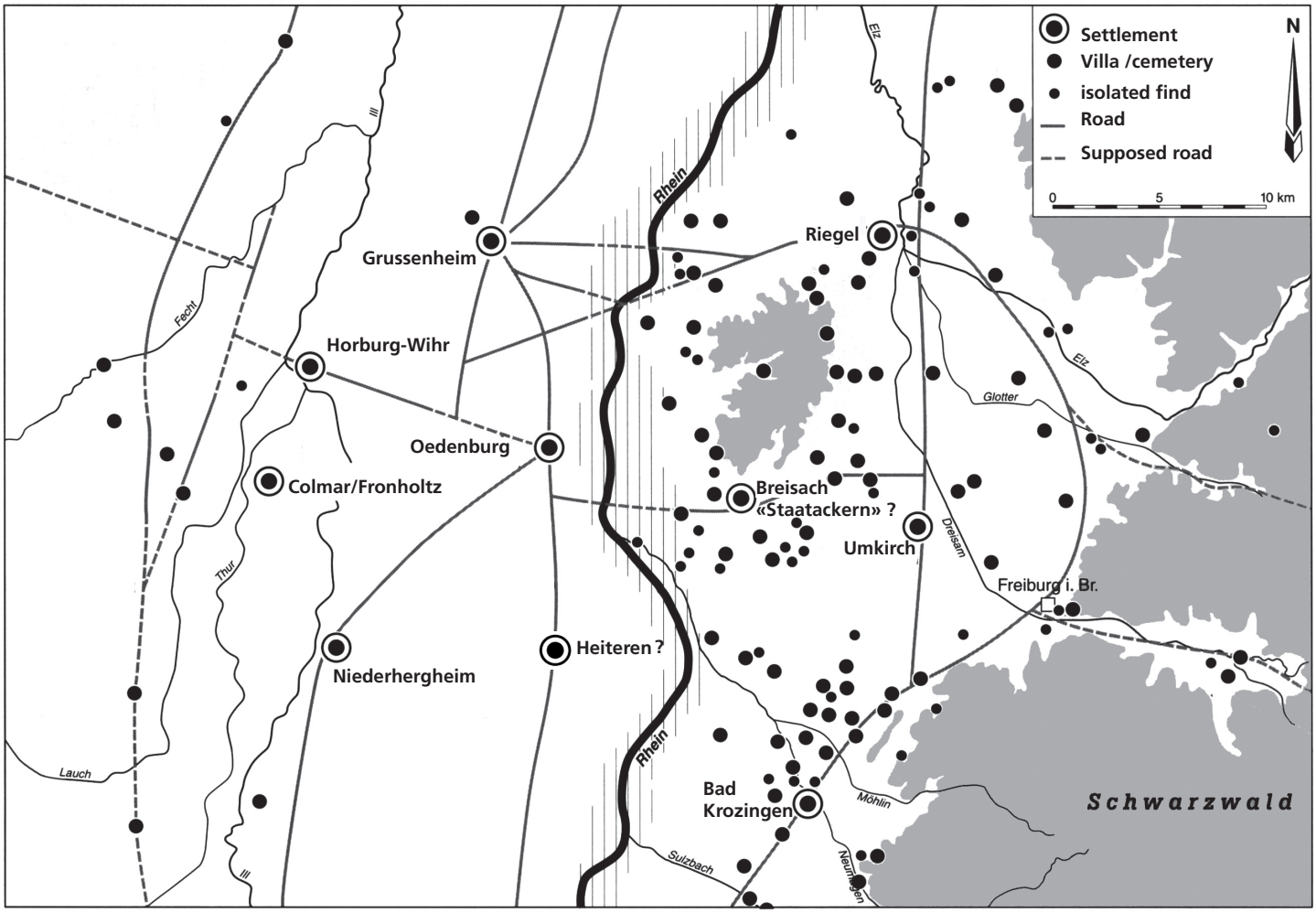
sectors of the Weichselian terrace to the west, around the Altkirch butte, that were free from flooding. A new fortification was built on this site when this sector of the Rhine was made into a defensive work in late Antiquity, probably under Valentinian.

Ancient Human settlement around Oedenburg

Two maps show that this sector of the Rhine plain seems to have been unequally settled in the late La Tène and in Roman times (fig. 9-10). The first shows the state of known protohistoric settlements (Blöck & Bräuning 2012). It reveals a sharp disparity between the foot of the Kaiserstuhl to the east and the area between the Rhine and the Ill to the west. This situation seems to have lasted until Roman times, for which the map by H. Bender and G. Pohl (Bender & Pohl 2005, 306) shows the same void, reflected by the near absence of agricultural buildings in the plain of Alsace ahead of the foothills of the Vosges. A careful systematic review of aerial photographs might provide some supplementary indications, but it does not seem it would radically alter these observations. Is this a state of archaeological research that differs between France and Germany or can some other explanation be suggested?



+ Fig. 9. Map of the distribution of late La Tène sites in the upper Rhine basin (Blöck *et al.* 2012).



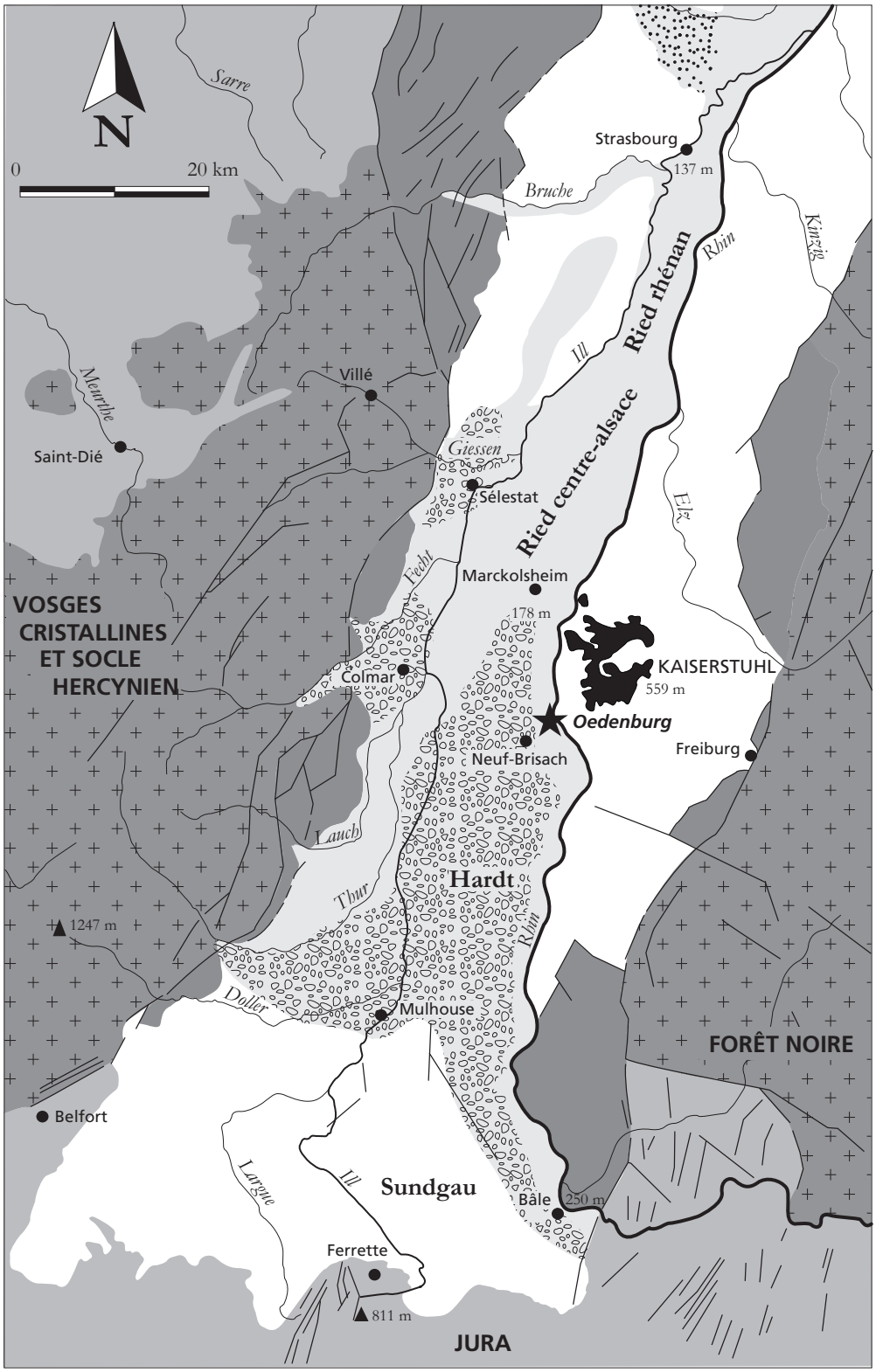
+ Fig. 10. Map of the distribution of Gallo-Roman sites around the Kaiserstuhl (Bender/Pohl 2005).

The agro-sylvo-pastoral geography of the Oedenburg sector

The simplified geomorphological map of this sector of the Rhine graben exhibits a marked contrast between the eastern bank of the river, mostly covered by loess, while the western bank is characterised mostly by pebbles and coarse sand ('Hardt') with little plant cover (fig. 11). Although it is fertile farmland today, was it in ancient times? Or was the Hardt still densely wooded with thin organic soils? The lack of studies of the ancient ecology of the regions, except at Oedenburg itself, precludes any straight answer to this question although it is crucial to our understanding of farming and human settlement in this sector of the Rhine plain in ancient times. In Bade, on the much more favourable loess soils, the earliest *villae* seem to have been built in the 30s of our era (Seitz 2003), that is, very shortly after the Roman military settlement of Oedenburg.

Archaeobotanical research by the University of Basel during the excavation of Oedenburg revealed a highly diversified flora (Vandorpe & Jacomet 2011). Beside the woodland of the wet valley bottom of the Rhine floodplain are various hardwood taxa that might come from the alluvial terraces of the site or the piedmont areas (fir). But the most remarkable feature is probably the suite of cultivated plants, reflecting in part the changes made in Roman times and the import and then local acclimatisation of new species of Mediterranean origin (fig. 12).

Cereals are mostly spelt, emmer and, to a lesser extent, einkorn. The free-threshing wheat and other cereals appear more marginally, apart from barley, the presence of which is hardly surprising in a military camp that had to maintain a number of horses and mules. The question is whether these various cereals were already cultivated on the spot before the military arrived or whether on the contrary their culture required, when the troop first settled, a vast operation of deforestation, especially of the alluvial terraces on the right bank or whether, as a third hypothesis,



+ Fig. 11. Simplified geological map of the Rhine graben in Alsace and Bade (V. Ollive / Ch. Petit).

Imports		
Nigella sativa	black cumin	*spice*
Olea europaea	olive	*fruit*
Phoenix dactylifera	date	*fruit*
Pinus pinea	stone pine	*nut*
Piper nigrum	black pepper	*spice*
Imported, local cultivation is questioned		
Carthamus tinctorius	saflor	*oil, dye and fibre plant*
Cucumis melo	melon	*fruit*
Cucumis sativus	cucumber	*fruit*
Ficus carica	fig	*fruit*
Lagenaria siceraria	bottle gourd	*vegetable*
Prunus persica	peach	*fruit*
Vitis vinifera	grapevine	*fruit*
Introduced and local cultivation plausible		
Allium sativum	garlic	*vegetable*
Anethum graveolens	dill	*spice*
Apium graveolens	celery	*spice*
Beta vulgaris	beet	*vegetable*
Carum carvi	caraway	*spice*
Coriandrum sativum	coriander	*spice*
Foeniculum vulgare	fennel	*spice*
Juglans regia	walnut	*nut*
Malus domestica	apple	*fruit*
Morus nigra	black mulberry	*fruit*
Pastinaca sativa	parsnip	*vegetable*
cf. *Petroselinum crispum*	parsley	*spice*
Pimpinella anisum	aniseed	*spice*
Prunus avium/cerasus	cherry	*fruit*
Prunus domestica	plum	*fruit*
Prunus insititia	plum	*fruit*
Pyrus communis/pyraster	pear	*fruit*
cf. *Ruta graveolens*	common rue	*spice*
Satureja hortensis	summer savory	*spice*

+ Fig. 12. Table of plants imported to Oedenburg (Vandorpe / Jacomet 2011).

they were imported to feed the garrison at least when the site was first occupied. In the first instance, the hypothesis presupposes the presence of a local farming population of which, it has been said, no trace has been found to date at Oedenburg itself. However, there is better evidence of such presence on the lower slopes of the Kaiserstuhl from the end of La Tène. It must not be considered, in this respect, that the Rhine was an uncrossable barrier and that the presence of a garrison on the left bank prohibited settlement of the right bank for cultivation or exploitation. Apart from the various testimony of the economic exploitation of the zone ahead of the official 'frontier' in Roman times (Tacitus, *Ann.* XIII, 54), various archaeological studies have revealed that the Bade plain, on the right bank, was exploited from an early date, well before it was officially annexed (Asskamp 1989).

This hypothesis seems to me more credible than any massive deforestation of huge swathes of the left bank, which *a priori* were not good farmland without soil enrichment and manuring and would not have been very productive in the short term. However, it does not exclude the importing of cereals over greater distances, from within Gaul, as observed for the beginning of the Roman period (Reddé 2011b). In other words, thinking about the agrarian economy of the site must be extended to a far wider area than the site itself and take into account the right-bank of the Rhine but also long-distance connections.

A number of other plants found at Oedenburg or in its immediate vicinity were probably grown in the gardens of the agglomeration that were developed from the middle of the first century of our era, or in its immediate vicinity: legumes, spices, salads, vegetables and fruit. However, again a distinction needs to be made between the pioneering period of human settlement when Mediterranean products were necessarily imported, and the later development after the military had left and when allogenous taxa could have become acclimatised.

The third fundamental component of the flora at Oedenburg was the grassland plants, both cultivated and natural varieties (fig. 13). Cultivated plants fared well on the wet valley bottom soils. Wild varieties thrived on the alluvial terraces close to the site. Both are found in the samples analysed, attesting to the local fodder production practices from the beginning of Roman times and of livestock farming required for agricultural practices and for feeding the population. It must be imagined there was meadowland in the immediate vicinity of the agglomeration or marginal grassland on the cleared, pebbly soils.

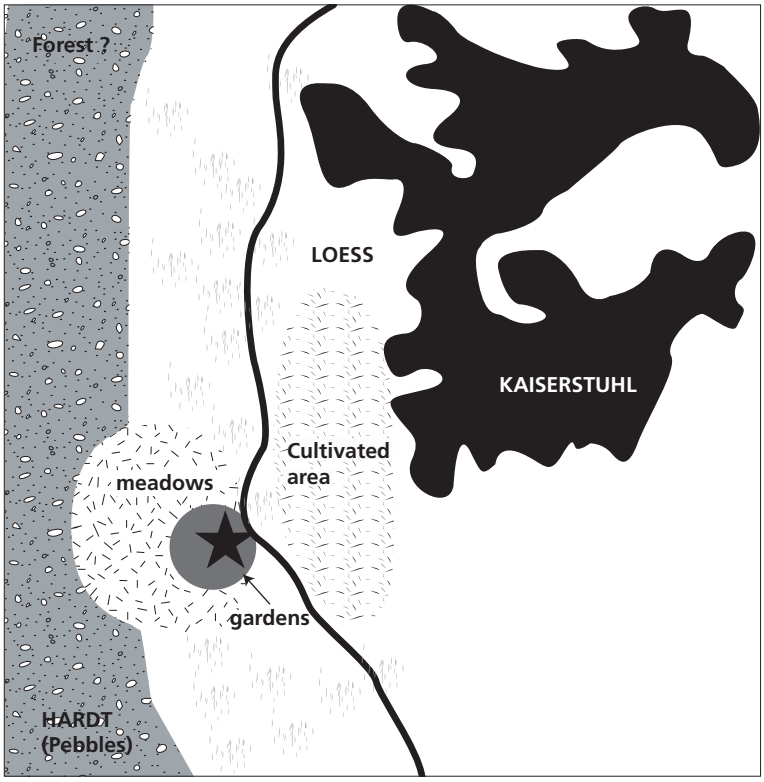
Molinio-Arrhenatheretea	*Achillea millefolium*	6.-9	*Nardus stricta**	5.-7
cultivated meadows and pastures	*Agrostis* sp.	6.-8	*Plantago lanceolata*	4.-9
	Bromus cf. *commutatus*	5.-6	*Plantago media*	5.-7
	Bromus hordeaceus	5.-6	*Poa pratensis*	5.-6
	Centaurea sp.	6.-9	*Potentilla erecta*	6.-9
	Dactylis glomerata	5.-6	*Prunella vulgaris*	6.-9
	Deschampsia caespitosa	6.-8	*Ranunculus acris*	4.-9
	Festuca rubra/ovina	5.-9	*Rhinanthus* sp.	5.-8
	Holcus lanatus	5.-8	*Rumex acetosa*	5.-8
	Leontodon autumnalis	7.-9	*Silene vulgaris*	6.-9
	Leucanthemum vulgare	5.-10	*Taraxacum officinale*	4.-10
	Lolium perenne	6.-9	*Trifolium pratense*	**5.-10**

Festuco-Brometea	*Dianthus* sp.	5.-10
moor or less arid poor calcareous swards	*Medicago lupulina*	5.-9
	Medicago minima	5.-6
	Odontites sp.	6.-10
	Prunella grandiflora	6.-10
	Scabiosa columbaria	6.-9
	Trifolium cf. *campestre*	5.-8

+ Fig. 13. Table of grassland plants discovered at Oedenburg (Vandorpe / Jacomet 2011).

Discussion

Reconstructing the geographical environment of an archaeological site is not just a mapmaking exercise. It requires sufficient information of very varied kinds to suggest thinking more akin to modelling than the representation of a real space, especially when one has, on a micro-regional scale, just one point of reference that cannot be compared with others as is the case here. I propose, then, by way of conclusion, an interpretative scheme for the beginning of the Roman era (fig. 14). I am aware of how many assumptions it contains but it seems to me that it reflects the current state of our yet limited knowledge of the site and its region. It shows the existence of different zones that take account of the agricultural potential of the soils around Oedenburg, on the left and right banks alike. To achieve a finer analysis, other more numerous data, on the scale of the *terroir*, would be necessary. It would also be useful to match this information with archaeo-zoological data, which has not been attempted as yet. Moreover, in the case of a frontier agglomeration like Oedenburg, one must wonder about the connections with its hinterland to understand the role of the various sectors of activity and their interactions. This large market town was not just a small regional capital with what might be termed 'quasi urban' functions (communications node, political and religious centre, local economic capital, centre for consumption and redistribution of produce). It also had its own productive capabilities, which were not just artisanal and agricultural output. The question of the economic complementarity between the rural environment in the medium distance and the immediate periphery of the agglomeration with its gardens or nearby fields must be asked. They may have been sufficient to feed a population that no parameter allows us to estimate with an acceptable margin of error. But we know next to nothing of the countryside around Oedenburg and it



+ Fig. 14. Theoretical schema of the agricultural production zone around Oedenburg (M. Reddé).

may even be wondered to what extent the Hardt had been cleared at the time. This gap precludes us from proposing any really credible model of the human settlement and agricultural output in Roman times on this frontier.

In conlusion one must outline the chronological change in the environmental factors that markedly altered between the beginning of the era and the end of Antiquity. These factors themselves were determined in part by man, at what is not a uniform historical pace. A potential proto-historic period but that is still unknown; a Roman military phase that might have had a major impact on the environment, but this is still to be proved with any certainty; a long entirely civilian settlement followed by re-militarisation in the course of the fourth century. The 'frontier' phenomenon in this sector at least cannot be apprehended by simple mechanical schemas inherited from a classical conception of the frontier as a military barrier.

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